3-11-1959

Test 686: Ford Model 641-D (Diesel)

Tractor Museum
University of Nebraska-Lincoln, TractorMuseumArchives@unl.edu

NEBRASKA TRACTOR TEST 686 - FORD 641-D DIESEL

The University of Nebraska Agricultural Experiment Station

W. V. Lambert, Director; Lincoln, Nebraska

BELT POWER PERFORMANCE

Hp	Crank shaft speed rpm	Fuel Consumption Gal per hr	Fuel Consumption Lb per hp-hr	Hp-hr per gal	Temperature Degrees F Cooling medium	Temperature Degrees F Air wet bulb	Temperature Degrees F Air dry bulb	Barometer inches of mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours								
31.78	2000	2.209	0.487	14.39	174	57	75	28.598
Standard Power Take-off Speed (540 rpm)—One Hour								
25.29	1499	1.759	0.488	14.38	171	56	75	28.585
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
28.41	2104	1.892	0.467	15.03	164	56	76	.....
1.43	2223	0.642	3.147	2.23	148	56	76	.....
12.47	2175	1.087	0.611	11.47	154	57	77	.....
31.62	1999	2.196	0.487	14.40	176	56	75	.....
6.33	2201	0.843	0.934	7.51	150	56	75	.....
18.51	2151	1.340	0.507	13.81	160	57	77	.....
Av 16.46	**2142**	**1.333**	**0.568**	**12.35**	**159**	**56**	**76**	**28.562**

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank shaft speed rpm	% Slip of drive wheels	Fuel Consumption Gal per hr	Fuel Consumption Lb per hp-hr	Hp-hr per gal	Temp. Degrees F Cool-ing med	Temp. Degrees F Air wet bulb	Temp. Degrees F Air dry bulb	Barometer inches of mercury
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—5th Gear											
29.33	2572	4.28	1998	5.64	2.254	0.539	13.01	158	33	36	28.953
75% of Pull at Maximum Power—Ten Hours—5th Gear											
22.82	1849	4.63	2130	4.28	1.746	0.536	13.07	150	34	37	29.137
50% of Pull at Maximum Power—Two Hours—5th Gear											
15.84	1256	4.73	2150	3.05	1.357	0.600	11.67	145	37	42	29.025
MAXIMUM POWER WITH BALLAST											
26.10	4230	2.31	2101	10.84	1st Gear.....			159	34	40	28.340
27.71	3836	2.71	2000	9.58	2nd Gear.....			160	34	40	28.370
28.43	3086	3.45	2001	7.72	3rd Gear.....			160	34	40	28.370
27.31	2498	4.10	2001	6.20	4th Gear.....			159	34	40	28.370
28.47	2507	4.26	1999	6.24	5th Gear.....			160	34	40	28.370
27.37	1929	5.32	2001	4.91	6th Gear.....			158	34	40	28.370
27.58	1631	6.34	1999	4.08	7th Gear.....			157	34	40	28.370
27.07	1556	6.52	2003	3.97	8th Gear.....			158	34	40	28.370
26.51	1124	8.84	2000	2.91	9th Gear.....			158	34	40	28.370
25.63	999	9.62	2002	2.62	10th Gear.....			158	34	40	28.370
23.69	656	13.54	2005	1.93	11th Gear.....			158	34	40	28.370
MAXIMUM POWER WITHOUT BALLAST											
27.76	2522	4.13	2001	10.57	5th Gear.....			166	52	69	28.825

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—5th Gear						
Pounds pull	2500	2700	2750	2800	2800	2700
Horsepower	28.5	27.4	24.9	22.4	18.7	15.1
Miles per hour	4.3	3.8	3.4	3.0	2.5	2.1

TIRES, BALLAST and WEIGHT		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 12.4-28;4;14	Two 12.4-28;4;12
Ballast	—Liquid	335 lb each	None
	—Cast iron	800 lb each	None
Front tires	—No, size, ply & psi	Two 5.50-16;4;28	Two 5.50-16;4;28
Ballast	—Liquid	None	None
	—Cast iron	126 lb each	None
Height of drawbar		21½ inches	22½ inches
Static weight	—Rear	4140 lb	1870 lb
	—Front	1582 lb	1330 lb
Total weight with operator		5897 lb	3375 lb

Department of Agricultural Engineering
Dates of Test: March 11 to March 18, 1959
Manufacturer: FORD MOTOR COMPANY, BIRMINGHAM, MICHIGAN
Manufacturer's Power Rating: Not Rated

FUEL, OIL and TIME Fuel No 2 Diesel **Cetane No** 51 (rating taken from oil company's typical inspection data) **Specific gravity converted to 60°/60°** 0.8418 **Weight per gallon** 7.009 lb **Oil** SAE 20-20W **API service classification** MS-DM **To motor** 1.081 gal **Drained from motor** 0.759 gal **Transmission and final-drive lubricant** SAE No 80 **Type** EP **Total time motor was operated** 47 hours.

ENGINE Make Ford Diesel **Type** 4 cylinder vertical **Serial No** 641-DS-53448 **Crankshaft mounted** lengthwise **Rated rpm** 2000 **Lubrication** pressure **Bore and stroke** 3.562" x 3.60" **Compression ratio** 16.8 to 1 **Displacement** 144 cu in **Cranking system** 12 volt battery **Air cleaner** oil washed wire mesh **Muffler** was used **Oil filter** full flow with replaceable paper element **Fuel filter** one replaceable paper element **Cooling medium temperature control** thermostat.

CHASSIS Type Standard **Serial No** 641-DS-53448 **Tread width** rear 52" to 76" front 52" to 80" **Wheel base** 74.5" **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 32" Vertical distance above roadway 25" Horizontal distance from center of rear wheel tread 0" to the right or left **Hydraulic control system** direct engine drive **Advertised speeds mph** first 2.54 second 3.09 third 3.80 fourth 4.47 fifth 4.61 sixth 5.77 seventh 6.72 eighth 7.03 ninth 9.38 tenth 10.18 eleventh 14.04 twelfth 16.01 reverse first 2.65 second 3.98 third 6.04 **Belt pulley** diam 9" face 6.50" rpm 1360 **Belt speed** 3199 fpm **Clutch** single plate dry disc operated by foot pedal **Brakes** internal expanding shoes operated by two foot pedals located on right side of tractor **Power take-off** 545 rpm at 1500 engine rpm **Steering** power assisted **Turning radius** (on concrete surface with brake applied) right 107" left 107" (on concrete surface without brake) right 118" left 118" **Turning space diameter** (on concrete surface with brake applied) right 217" left 217" (on concrete surface without brake) right 246" left 246".

REPAIRS AND ADJUSTMENTS Due to a fuel leak, a new fuel injector tube assembly was installed during the 10 hour run.

REMARKS All test results were determined from observed data obtained in accordance with SAE and ASAE test code. Twelfth gear was over 15 mph and therefore was not tested.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No 686.

L. F. LARSEN
Engineer-in-Charge

L. W. HURLBUT
G. W. STEINBRUEGGE
J. J. SULEK
Board of Tractor
Test Engineers

EXPLANATION OF TEST REPORT

GENERAL CONDITIONS

Each tractor is a production model equipped for common useage. Power consuming accessories can be disconnected only when it is convenient for the operator to do so in practice. Additional weight can be added as ballast if the manufacturer regularly supplies it for sale. The static tire loads and the inflation pressures must conform to recommendations in the Tire Standards published by the Society of Automotive Engineers.

PREPARATION FOR PERFORMANCE RUNS

The engine crankcase is drained and refilled with a measured amount of new oil conforming to specifications in the operators manual. The fuel used and the maintenance operations must also conform to the published information delivered with the tractor. The tractor is then limbered-up for 12 hours on drawbar work in accordance with the manufacturers published recommendations. The manufacturers representative is present to make appropriate decisions regarding mechanical adjustments.

The tractor is equipped with approximately the amount of added ballast that is used during maximum drawbar tests. The tire tread-bar height must be at least 65% of new tread height prior to the maximum power run.

BELT OR POWER TAKE-OFF PERFORMANCE

Maximum Power and Fuel Consumption. The manufacturers representative makes carburetor, fuel pump, ignition and governor control settings which remain unchanged throughout all subsequent runs. The governor and the manually operated governor control lever is set to provide the high-idle speed specified by the manufacturer for maximum power. Maximum power is measured by connecting the belt pully or the power take-off to a dynamometer. The dynamometer load is then gradually increased until the engine is operating at the rated speed specified by the manufacturer for maximum power. The corresponding fuel consumption is measured.

Varying Power and Fuel Consumption. Six different horsepower levels are used to show corresponding fuel consumption rates and how the governor causes the engine to react to the following changes in dynamometer load: 85% of the dynamometer torque at maximum power; minimum dynamometer torque, ½ the 85% torque; maximum power; ¼ and ¾ of the 85% torque. Since a tractor is generally subjected to varying loads the average of the results in this test serve well for predicting the fuel consumption of a tractor in general useage.

DRAWBAR PERFORMANCE

All engine adjustments are the same as those used in the belt or power take-off tests. If the manufacturer specifies a different rated crankshaft speed for drawbar operations, then the position of the manually operated governor control is changed to provide the high-idle speed specified by the manufacturer in the operating instructions.

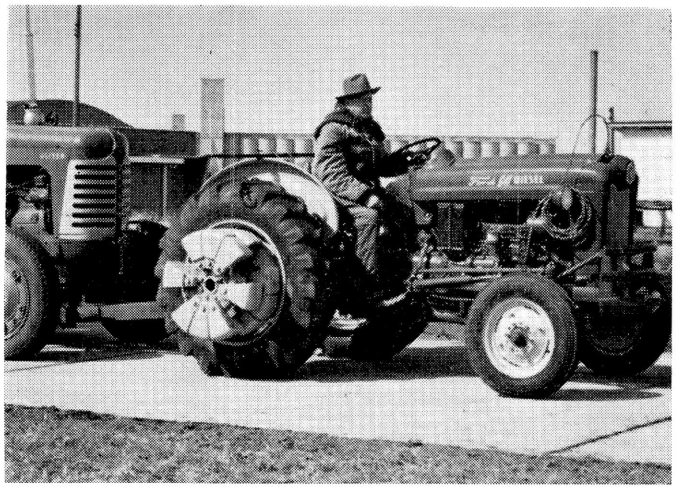
Varying Power and Fuel Consumption With Ballast. The varying power runs are made to show the effect of speed-control devices (engine governor, automatic transmissions, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to the pull at maximum power as possible and still have the tractor maintain the travel speed at maximum horsepower on the straight sections of the test course; (2) 75% of the pull at maximum power; and (3) 50% of the pull at maximum power. Prior to 1958, fuel consumption data (10 hour test) were shown only for the pull obtained at maximum power for tractors having torque converters and at 75% of the pull obtained at maximum power for gear-type tractors.

Maximum Power with Ballast. Maximum power is measured on straight level sections of the test course. Data are shown for not more than 12 different gears or travel speeds. Some gears or travel speeds may be omitted because of high slippage of the traction members or because the travel speed may exceed the safe-limit for the test course. The maximum safe speed for the Nebraska Test Course has been set at 15 miles per hour. The slippage limits have been set at 15% and 7% for pneumatic tires and steel tracks or lugs, respectively. Higher slippage gives widely varying results.

Maximum Power Without Ballast. All added ballast is removed from the tractor. The maximum drawbar power of the tractor is determined by the same procedure used for getting maximum power with ballast. The gear (or travel speed) is the same as that used in the 10-hour test.

Varying Power and Travel Speed with Ballast. Travel speeds corresponding to drawbar pulls beyond the maximum power range are obtained to show the "lugging ability" of the tractor. The run starts with the pull at maximum power; then additional drawbar pull is applied to cause decreasing speeds. The run is ended by one of three conditions; (1) maximum pull is obtained, (2) the maximum slippage limit is reached, or (3) some other operating limit is reached.

For additional information about the **Nebraska Tractor Tests** write to the **Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska.**



Ford 641-D Diesel